REMARKS

This amendment is being filed in response to the Office Action dated June 19, 2002 for the above-referenced patent application. Claims 28 and 44 are canceled and replaced with new claims 55 and 56, respectively. Claims 29-43, 45-51, 53, 55 and 56 are pending in the application.

The Specification has been objected to because it does not include headings for the relevant sections. A substitute Specification is submitted to overcome this objection. No new matter has been added.

The Claim Rejections Under 35 U.S.C. § 112 Should Be Withdrawn

Claims 28-36 and 38-54 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly Claim the subject matter which applicant regards as the invention. Specifically, the Examiner states that there is insufficient antecedant basis for the limitations in Claim 28 and that the recitation of the "focus" and "distance of the capture area" is vague and indefinite. Also, the Examiner states that Claim 28 is incomplete because it omits essential steps and does not allow the a reasonable interpretation of what is occurring in the process.

Applicant has amended the claims to overcome the rejection under 35 U.S.C. §112. Claim 28 has been rewritten as new claim 55, having substantially the same scope, to overcome the rejections (*see* Specification, page 1, paragraph 2; page 6 paragraph 1; page 7 paragraph 1). Furthermore, in the first paragraph of Claim 55, the optically-induced forces are defined as being capable to move a particle into a focus of an optical cage. This feature is known in the prior art (*see* Specification, page 1). In the second paragraph, of Claim 55, the positioning

of the focus in a microelectrode arrangement with a distance from a capture point is defined. The function of the microelectrode is also known from the prior art. The steps b, c and d define important procedural stages of the invention. First, the particle is positioned either in the focus or at the capture point. Then the field properties are varied in step c until the particle is moved between the focus and the capture point. Finally, the field properties at which the particle moves are detected or the particle simply is moved between the focus and the capture point in step d.

Claim 30 has been rejected because there is insufficient antecedent basis for the limitation "the positions." Also, the Examiner states that recitation of "mutual alignment of the positions of the focus" is vague and indefinite because the meaning of the limitation is unclear. The Claim has been amended to overcome the rejection.

Claim 31 has been rejected because the limitation "the positions" lacks antecedant basis. The Claim has been amended to overcome the rejection.

Claims 32-36 have been rejected as vague and indefinite because they depend on cancelled Claim 1. The Claims have been amended to depend on new Claim 55 to overcome the rejection.

Claim 32 has been rejected because there is insufficient antecedent basis for the limitation "the particle diameter." The Claim has been amended to overcome the rejection.

Claim 33 has been rejected because there is insufficient antecedent basis for the limitations "the beam field" and "the associated value." The Claim has been amended to overcome the rejection.

Claim 34 has been rejected as vague and indefinite because it is alleged that it is unclear if the positioning in set positions refers to the capture area or the particles. The Claim has been amended to overcome the rejection.

Claim 35 has been rejected because it is alleged there is insufficient antecedent basis for the limitation "the capture quality." Also, the Examiner alleges that the recitation of "other calibration properties" is vague and indefinite because it does not allow for the metes and bounds of the Claim to be adequately identified. The Claim has been amended to overcome the rejection.

Claim 36 has been rejected as vague and indefinite because it is unclear what the characterization encompasses. The Claim has been amended to overcome the rejection.

Claims 38-43 have been rejected because they depend on a non-elected Claim. The dependency of Claims 38-43 have been changed to depend only from Claim 55 to overcome the rejection.

Claim 38 has been rejected because the limitation "the electrodes" has insufficient antecedent basis. The Claim has been amended to overcome the rejection.

Claim 39 has been rejected as vague and indefinite because it is unclear if the filled barrier is a part of the optical cage or merely separates the cage from the capture area. The Claim has been amended to more clearly identify the arrangement of the components.

Claim 40 has been rejected because there is insufficient antecedent basis for the limitation "the particle movement." The Claim has been amended to overcome the rejection.

Claim 41 has been rejected as vague and indefinite for the recitation of a particle size "below 200μm" because this encompasses a size of 0. The Claim has been amended to overcome the rejection.

Claim 43 has been rejected because there is insufficient antecedent basis for the limitation "the transitional movement." Also, it is alleged the recitation of adjusting the optical cage is vague and indefinite because the manner in which the cage is adjusted has not been recited. The Claim has been amended to overcome the rejection.

Claim 44 has been rejected because there is insufficient antecedent basis for the limitations "the focus" and "the movement." Also, the Examiner alleges that the recitations of the microelectrode arrangement set up to form an electrical filed and an illuminating device set up to form an optical cage are vague and indefinite because the manner in which they are set up to accomplish the recited function has not been recited in the Claims. The Claim has been amended to more clearly recite the manner in which the function is accomplished. The device of Claim 44 proposes to combine a fluidic microsystem with a laser illuminating device and an optical monitoring/detection device, for example comprising a microscope (*see* Specification, page 14, paragraph 2). No new matter has been added.

Claim 46 has been rejected because there is insufficient antecedent basis for the limitation "the thickness." Also, it is alleged that the recitation of "less than 500μm" is vague and indefinite because the limitation encompasses a size of 0. The Claim has been amended to overcome the rejection. Applicant maintains that less than 500μm is not vague.

Claim 49 has been rejected because there is insufficient antecedent basis for the limitation "the x,y, and/or z direction." It is also alleged that the recitation of "set up" is vague

and indefinite because the way in which the electrodes are set up to create multiple fields has not been recited. In addition, it is alleged that the term "numerous" renders the Claim indefinite because one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The Claim has been amended to overcome the rejection.

Claim 50 has been rejected because there is insufficient antecedent basis for the limitation "the suspension liquid." Also, the Examiner states that to maintain consistent terminology "fluid" should be inserted before "microsystem." The Claim has been amended to overcome the rejection.

Claim 52 has been rejected as vague and indefinite because the applicant has not recited the methods used to make the device. Applicants have canceled Claim 52.

Claims 53 and 54 have been rejected as vague and indefinite because they depend on canceled Claims. In addition, Claims 53 and 54 have been rejected since the Claims do not set forth any steps involved in the method/process. Claim 53 has been amended to depend on Claim 55 and clearly set forth the steps involved in the process. Claim 54 has been canceled.

The Claim Rejections Under 35 U.S.C. § 102 Should Be Withdrawn

Claims 28-30, 32-36, 39-44 and 53-54 have been rejected under 35 U.S.C. §102(b) as being anticipated by K. Morishima et al., Proc. of IEEE (1997) (Morishima et al.). It is alleged that Morishima discloses a microchannel system for screening of E. coli, wherein the bacteria are manipulated by dielectrophoretic force and radiation pressure of a laser tweezer. Applicants respectively transverses this rejection.

As described in the introductory portion of the present application (*see* Specification), Morishima describes the combination of optical and dielectrophoretic

manipulation of microorganisms. First, one microorganism is selected from a group of microorganisms with a laser-tweezer. Then the remaining microorganisms are separated from the selected microorganism by the use of the dielectrophoretic forces. However, Morishima et al. does not disclose an electrical field cage with a capture area. In Morishima et al. the microorganisms are separated into different directions to the border of the microelectrode arrangement (*see* Morishima et al., Figure 3). Furthermore, Morishima et al. does not disclose the limitations of steps c and d of Claim 55.

Therefore, in view of the foregoing, reconsideration and withdrawal of the rejections based on anticipation by K. Morishima et al., Proc. of IEEE (1997) (Morishima et al.) is respectfully requested.

The Claim Rejections Under 35 U.S.C. § 103 Should Be Withdrawn

Claim 31 has been rejected under 35 U.S.C. §103(a) as being obvious in view of K. Morishima et al., Proc. of IEEE (1997) (Morishima et al.) further in view of K. Svoboda, in Ann. Rev. Biophys. Biomol. Struc., 90, 209 (1994) (Svoboda). Applicant respectfully transverses this rejection.

However, since Claim 31 depends on independent Claim 55, which is not obvious in view of Morishima et al. further in view of Svoboda, the dependent Claim is nonobvious and patentable. Therefore, in view of the foregoing, reconsideration and withdrawal of the rejection of Claim 31 as obvious in view of K. Morishima et al., Proc. of IEEE (1997) (Morishima et al.) further in view of K. Svoboda, in Ann. Rev. Biophys. Biomol. Struc., 90, 209 (1994) (Svoboda) is respectfully requested.

Claims 38 and 45-52 have been rejected under 35 U.S.C. §103(a) as being obvious in view of K. Morishima et al., Proc. of IEEE (1997) (Morishima et al.) further in view of G. Fuhr et al., Biochim. Biophys. Acta., 1201, 353 (1994) (Fuhr et al.). The Examiner has stated that Morishima et al. teach the use of electric fields and tweezers, but fails to teach the manner in which the microelectrodes are construed or the arrangement of the electrodes. The Examiner has also stated that Fuhr et al. teach cell manipulation and cultivation under the influence of an electric field. It is alleged that it would have been obvious to use the arrangement of electrodes and method of manufacture taught by Fuhr et al. with the method and device of Morishima et al.

As stated above, Morishima et al. describes the combination of optical and dielectrophoretic manipulation of microorganisms. First, one microorganism is selected from a group of microorganisms with a laser-tweezer. Then the remaining microorganisms are separated from the selected microorganism by the use of the dielectrophoretic forces. Fuhr et al. discloses the manipulation of dielectric particles in high frequency dielectric fields under the influence of dielectrophoretic forces. However, Fuhr et al does not disclose the use of an optical cage as described in amended independent Claims 55 and 56. Furthermore, Morishima does not disclose an electric field cage as described in independent Claim 56.

With regard to the inventive step, it is to be emphasized that the function of the combination of optical and dielectrophoretic forces according to Morishima et al. is completely different from the combination claimed in the present invention. According to Morishima et al. the microorganisms are separated from one selected microorganism, which is kept in the optical cage. However, there is no movement of the particle between the optical cage and the separated condition at the border of the microelectrode arrangement. As a result, the selected particle in

the optical cage is not moved to the border of the microelectrode arrangement. Therefore, Morishima et al. does not disclose or suggest the combined operation of optical and electrical cages as described in the present invention. According to the present invention, field properties of the cages are varied, in step c, so that the balance between both cages is modified until the particles move between the cages. This is neither disclosed or contemplated by Morishima et al. nor by Fuhr et al.

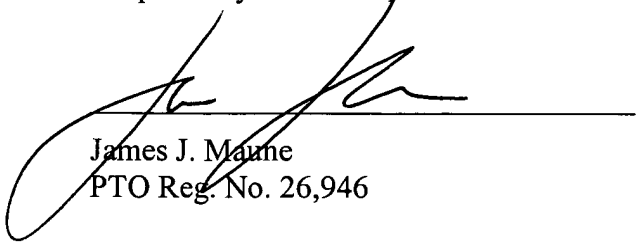
YES

Therefore, in view of the foregoing, reconsideration and withdrawal of the rejection of Claims 38 and 45-52 as obvious in view of K. Morishima et al., Proc. of IEEE (1997) (Morishima et al.) further in view of G. Fuhr et al., Biochim. Biophys. Acta., 1201, 353 (1994) (Fuhr et al.)is respectfully requested.

In view of the foregoing amendments and remarks, reconsideration and allowance of all claims is respectfully requested.

Attached hereto is a marked-up version of the changes made to the specification by the current amendment. The attached page is captioned "**Version with markings to show changes made.**"

Respectfully submitted,



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Enclosures

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

The claims have been amended as follows:

-29. (Amended) The process according to claim 55 [28] in which a particle is placed in the focus or capture area to measure optically-induced forces, and the optically-induced forces are measured from the amplitude of the electrical field and the distance of the capture area from the focus when the particle moves from the focus to the capture area or vice versa.—

--30. (Amended) The process according to claim 29 in which the optically-induced forces are repeatedly measured for all relevant directions in space corresponding to mutual alignment of said [the] positions of said [the] focus and said [to the] capture area.—

--31. (Amended) The process according to claim 29 in which the optical cage is calibrated by determining a [the] relationship between the light power to generate the optical cage and the forces induced on a particle in the optical cage.--

--32. (Amended) The process according to claim [1] 55 in which the distance between the focus and capture area is at least one-tenth of a [the] particle diameter.--

--33. (Amended) The process according to claim [1] 55 in which the capture area is a capture point that is in a [the] beam field of the optical cage so that the at least one particle moves back

and forth between the capture point and focus when the amplitude of one of the electrode signals and [or] light power is varied [lowered or increased], and an [the] associated value of the amplitude is used to measure the optically-induced forces.--

--34. (Amended) The process according to claim [1] 55 in which numerous particles are sequentially injected with said optical cage into said [the] capture area, wherein said particles [that] are positioned in predetermined [set] positions within [with the optical cage in] the capture area relative to other [possibly existing] particles in the capture area.—

--35. (Amended) The process according to claim [1] 55 in which the light beam of the optical cage is adjusted and[/or] one of a capture quality and symmetry [the capture quality, symmetry or other calibration properties] of the optical cage are measured.--

--36. (Amended) The process according to claim [1] 55 in which passive electric properties of said at least one particle are [in which the particle is] characterized based on the measured optically-induced forces.--

--38. (Amended) The process according to claim 55 in [one of claims 28 or 37] which an [the] electrode [electrodes] of the microelectrode arrangement is alternatively [are alternatingly] supplied with at least one of signals phase-shifted 180° and[/or with] rotation-generating signals with a predetermined phase division.—

--39. (Amended) The process according to claim 55 [one of claims 28 or 37] in which at least one field barrier is formed between said capture point and said optical cage [the capture area is separated by at least one field barrier from the optical cage].--

--40. (Amended) The process according to claim 55 [one of claims 28 or 37] in which a [the] particle movement is detected by one of optical and electrical detection [optically and/or electrically detected].--

--41. (Amended) The process according to claim 55 [one of claims 28 or 37] in which the particles are synthetic or natural particles with a size less than [below] 200 μm.--

--42. (Amended) The process according to claim 55 [one of claims 28 or 37] in which the particles are biological cells or their components.--

--43. (Amended) The process according to claim 55 [one of claims 28 or 37] in which the [transitional] movement of the particle between [from] the capture area and [to] the focus [or vice versa] is used to adjust the optical cage.--

--45. (Amended) The device according to claim 56 [44] in which the microelectrode arrangement comprises flat electrodes that are in groups on two spaced substrates of which at least one is transparent.—

--46. (Amended) The device according to claim 45 in which [the thickness of] the transparent substrate is has a thickness of less than 500 μm.--

--49. (Amended) The device according to claims 56 [44] in which the microelectrode arrangement comprises [numerous] electrodes that are set up to generate a multiple field with an electrical field distribution symmetrical in at least one of the x, y and [and/or] z direction.--

--50. (Amended) The device according to claim 56 [44] in which the electrodes are coated with a layer of one of an insulating material, dielectric [layer] or [consist of] a metal[s], which layer is [that are] essentially inert to a [the] suspension liquid in the fluid microsystem.--

--52. (Amended) The device according to claim 56 [44] in which the electrodes are constructed in three-dimensional shapes at least partially using methods from semiconductor technology[, or are constructed using hybrid techniques].--

--53. (Amended) Calibrating a laser tweezer by exerting optically-induced forces on at least one particle and measuring said forces with [Method of using] a procedure according to claim [1] 55 [to calibrate a laser tweezer].--